

KOTZIN ET AL.  
"Emergency Deployable GPS Antenna"  
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Handheld two-way radio transceivers (also known as cell phones) are well known in the art. Recent designs for such transceivers do not require a manually extendable antenna for cellular operation. It is also known to provide cellular phones with the feature of receiving a GPS signal from a GPS satellite for determining location of the cell phone. GPS refers generically to satellite positioning systems comprising a system or constellation of navigation satellites orbiting a celestial body. Exemplary earth-orbiting satellite positioning system constellations include NAVSTAR GPS, GLONASS, and Galileo. Cell phones receive GPS signals so that operators in a public safety answering center are able to determine the location of the cell phone by receiving a GPS signal via the cell phone. This feature assists in locating cell phones and their users during emergency situations. In the Global Positioning System each GPS satellite transmits its own position, its time, and a long pseudo random noise code. The noise code is used by the receiver to calculate range. Satellite position and time are derived from on-board celestial navigation equipment and atomic clocks accurate to one second in 300,000 years. But the ranging is the heart of GPS. Both in the receiver, and in the satellite, a very long sequence of apparently random bits are generated. By comparing internal stream of bits in the receiver to the precisely duplicate received bits from the satellite, and "aligning" the two streams, a shift error or displacement can be calculated representing the precise travel time from satellite to receiver. Since the receiver also knows the precise position of the satellite, and its range from the receiver, a simple triangulation calculation can give two dimensional position (lat/long) from three satellites and additional elevation information from a fourth.